

by a simple mechanical analogue, by means of which the conception of absolute temperature is introduced. The determination of specific heats, properties of gases, change of state, Van der Waals's equation, and the critical point are well treated, and an attempt is made to explain the phenomena from the molecular standpoint, so far as this can be done by general reasoning. The author's treatment of thermodynamics, however, does not present any striking divergence from the conventional standpoint in which conservation of energy necessarily occupies a prominent position. Of the chapters on electricity, magnetism and light, we can only say that they appear to form a concise and convenient introduction to the elementary principles of the subject.

As an introductory sketch of the outlines of natural philosophy, the book may be unhesitatingly recommended. The wide range of ground covered renders the treatment somewhat encyclopædic, but a notable feature is the large amount of historical information with which each chapter opens. This alone makes the volume valuable as a work of reference.

Another excellent feature is the large number of examples on nearly every section. Many of these are straightforward numerical calculations based on the bookwork, nearly all of them illustrate some point of physical interest. But it is a pity that the student after reading the question sees the answer before him, instead of having an opportunity to work it out for himself; these answers would be much better placed at the end of the book.

Whether Herr Januschke has succeeded or not in establishing the superiority of the "energetic" method, there can be no doubt that he has produced a text-book which will prove of great use to students, and still more to teachers of physics.

G. H. BRYAN.

#### THE FERTILITY OF THE LAND.

*The Fertility of the Land.* By Isaac P. Roberts. Pp. xvii + 415. With forty-five illustrations. (New York: The Macmillan Company. London: Macmillan and Co., Ltd., 1897.)

THE sub-title of this volume, "A summary sketch of the relationship of farm-practice to the maintaining and increasing of the productivity of the soil," conveys a comprehensive idea of its scope. It belongs to the Rural Science Series, and Mr. L. H. Bailey, who contributes the preface, bestows upon the book a sort of editorial benediction when he commits himself to the statement, "It is the ripened judgment of the wisest farmer whom I have known." The editor further remarks,

"I confess that I have looked with some apprehension upon the rapid diffusion of experimental science of recent years, for there is danger that this knowledge may overshadow the importance of accustomed farm-practice, and lead the farmer to demand specific rules for each perplexity, and to depend upon the Experiment Station and the teacher for his farming."

The fifteen chapters deal with the following subjects: (1) an inventory of the land; (2) the evolution of the plough; (3) tilling the land; (4) conservation of moisture; (5) irrigation and drainage; (6) farm manures; (7)

manures produced by various animals; (8) the waste of manures; (9) the care, preservation and application of manures; (10) nitrogen and nitrification; (11) the phosphoric acid and potash supply; (12) commercial fertilisers; (13) lime and various amendments; (14) green manures and fallows; (15) rotations. The treatment of the subject is thus seen to be fairly discursive, and the omission of, for example, the second chapter on the evolution of the plough would in no way have detracted from the main object of the volume. It may be noted in passing that the part of the implement which is familiarly known in this country as the skim coulter is designated the "jointer or skim plough" by the author; we think the English name is preferable as being more descriptive. Much valuable information is brought together in the volume in a convenient form, whilst most of the assertions made by the author, though they may not always carry conviction, are suggestive in character and calculated to stimulate useful trains of thought in the student's mind. The chief defect of the volume is that it ignores the epoch-making work in which Lawes and Gilbert have been engaged for more than half a century. Neither their names nor the name of Rothamsted are mentioned in the index, nor do we come across any reference to them in the text. As the author, we are told, "has had the advantage of much travel," we can only suppose this omission is intentional. The book, of course, suffers in consequence; to give only one instance, the author has missed entirely the admirable definitions of "fertility" and "condition" as applied by Lawes to the soil, and as usefully adopted for practical purposes by English farmers. That the writer is not altogether successful in his selection of authorities is further apparent from the circumstance that he betrays no knowledge of the researches of Warington in nitrification. There is evidence, however, of much familiarity with continental work, and the title of the thirteenth chapter, "lime and various amendments," has an unmistakably French flavour. The book is well printed and neatly turned out; but the Englishman who respects his mother-tongue will experience a shudder at the strange spectacle presented by certain familiar words spelt in "American."

#### CRIME AND CRIMINALS.

*Crime and Criminals.* By J. Sanderson Christison, M.D. Pp. 117. (Chicago: The W. T. Keenen Company, 1897.)

DR. CHRISTISON has been attracted to a subject full of difficult problems, but he makes no very practical contribution to their solution. He is a student in the school of Lombroso, and has been at some pains to investigate the psychological aspects of the criminal. The cases he presents are, many of them, interesting enough; but beyond proving the fact that the types of offenders are much the same all the world over, they serve no particular purpose, and they are certainly not sufficient to justify the main point of his book—that our existing penal methods are a failure. He has been helped to this conclusion, moreover, by the single experience of the United States where, in his own words, "crimes are now nearly five times as numerous

as forty years ago." The criminal statistics of other countries, notably of England and Belgium, can happily show different figures, judging by the numbers incarcerated now and in previous years, the only trustworthy test indeed. Dr. Christison seems inclined to lay too much stress upon prison systems as affecting the increase and decrease of crime. Where they are manifestly bad, as it is to be feared they are in a very large proportion of cases in the United States, they may manufacture criminals. For example, there is no more fruitful source of crime than the indiscriminate association of prisoners of all classes and categories which is still very general in American prisons. For one Elmira, with its ultra-tenderness for the dishonest, there are hundreds of county gaols where no sort of care is taken to separate the inmates, whether young or old, innocent or guilty; and it is where this separation has been most strictly enforced, as with us, that crime has most appreciably diminished.

But the penal system, however carefully and intelligently worked, is but a small contributory cause to reduction. That is to be found rather in the newer and more enlightened processes of deferred sentences for first offenders and of systematic child rescue, both based upon the excellent principle that crime should be checked in the bud. Dr. Christison enunciates a truism when he declares that crime is frequently associated with bodily and brain disease. No one denies this; it is, too often the poor invertebrate creatures who have no sinew, moral or physical, who lapse into misdeeds, and they deserve pity rather than punishment. But these do not make up the sum total of the great army of crime; they do not include the stalwart, able-bodied habitual criminal—the real crux of modern penology—who has adopted law-breaking as a business, and whom nothing, humanely speaking, will cure. To apply Dr. Christison's kindly milk and water treatment to these would be a mischievous misuse of the power of the law, the first duty of which is to protect the law-abiding from the law-breaking. The habitual criminal should have neither truce nor peace. Penal science is fast tending to establish the somewhat paradoxical apothegm of a well-known writer who has said that offenders may be divided into two great classes: "those who should never go into prison and those who should never be let out"; the first offender who should be left at large on condition that he does not again go wrong, and the habitual criminal who is retained indefinitely, or until he gives reasonable promise that he will not persistently misuse his freedom.

#### OUR BOOK SHELF.

*Chauncy Maples, D.D., F.R.G.S. A Sketch of his Life, with Selections from his Letters.* By his Sister. Pp. 403. (London: Longmans, Green, and Co., 1897.)

THE publication of this memoir of Dr. Chauncy Maples—a pioneer missionary in East Central Africa for twenty years—reveals that sympathetic interest in science which has been strikingly noteworthy in some of the most remarkable missionaries of our time. In 1881 Mr. Maples, then stationed at Masasi, made a journey of 900 miles to the Meto country, and in this and other ways contributed to our knowledge of the geography of East

Africa. His papers were appreciated by the Royal Geographical Society, of which he was a Fellow. And he quite entered into the spirit of the recent development of Nyasaland at the hands of the British administrators, founding and editing the *Nyasa News*, which was printed on the island of Likoma by his native boys. Sir Harry Johnston, K.C.M.G., contributed to it, and writes cordially of the late Bishop in his recent book on "British Central Africa." Sir Harry was almost the last European to see him alive; for a few days afterwards he was drowned in the Lake Nyasa, September 3, 1895, on his way to his post. In the Bishop's last letter but one, written, of course, before the knighthood, he says: "I was more struck than ever with the Commissioner's cleverness and accomplishments and his power of doing so many things, as he does, so very well. He is certainly a very remarkable man indeed."

On the other hand, Mr. G. F. Scott-Elliot, a scientific traveller well known to the readers of *NATURE*, looked upon Chauncy Maples as "an ideal missionary," and described him as "one whose sympathies extend even to Europeans." Several times in the letters now published reference is gratefully made to the geological works of Sir Archibald Geikie. In a private letter dated Likoma, March 14, 1888, Archdeacon Chauncy Maples has the following striking and sympathetic reference to Charles Darwin:—

"It would seem that part of his nature adapted to the reception and cultivation of religious truth got atrophied by disuse, and hence his discarding of Christianity. These things are great mysteries, and when we think of so great and really good a man as Darwin was, we ought to avoid all appearance even of seeming to know *how* he stood in God's sight when his probation was over and his soul returned to God who gave it. . . . Another great point about Darwin was that he never did or said anything that could be construed into a desire to disturb the faith of others; if evolution has disturbed it, it is their fault and not his. I confess to having a good deal of belief in evolution; but it has never disturbed my faith in revelation—no, not one jot" (p. 294).

The late Bishop was, like the friend and colleague who has succeeded him as Archdeacon, the Rev. W. P. Johnson, a graduate of University College, Oxford. His successor, the present Bishop of Likoma, Dr. J. E. Hine, is also an Oxford man, having graduated in science both in Oxford and London. Of the latter University he is M.D. It is also remarkable that another South African Bishop had a distinguished scientific career, both at London and Cambridge. The Bishop of Bloemfontein, the Right Rev. J. W. Hicks, is Doctor both of Medicine and of Theology. He is M.D. Lond., D.D. and Sc.D. Camb., and late Fellow and Science Tutor of Sidney Sussex College, Cambridge.

J. F. H.

*Les Ballons-Sondes.* Par M. de Fonvielle. (Paris: Librairie Gauthier-Villars, 1898.)

WITHIN the last seven years a new epoch has dawned upon the science of aerial travel and investigation.

While the more directly practical advances in flying machines and balloon navigation have caught the popular fancy, a less conspicuous but more valuable means of extending our present knowledge of atmospheric physics has been supplied by the recently organised flight of small, specially constructed balloons provided with self-recording apparatus which, without the deterring weight of observers, have been able to explore regions of the atmosphere far beyond the limits of human endurance.

M. de Fonvielle, the celebrated French aeronaut, has brought together the results so far attained in a neat little brochure entitled "*Les Ballons-Sondes*," or "sounding balloons." Perhaps "exploring balloons" would be a freer and more euphonious translation.

Here we have in four chapters a clear and simple